



MIDTERM EXAMINATION

MTH101- Calculus And Analytical Geometry

Question No: 1 (Marks: 1) - Please choose one

The set $\{\dots, -4, -3, -2, -1, 0, 1, 2, 3, 4, \dots\}$ is known as set of

- ▶ Natural numbers
- ▶ **Integers**
- ▶ Whole numbers
- ▶ None of these

Question No: 2 (Marks: 1) - Please choose one

$$h(x) = \frac{1}{(x-2)(x-4)}$$

The domain of the function is

- ▶ **$(-\infty, 2) \cup (2, 4) \cup (4, +\infty)$**
- ▶ $(-\infty, 2) \cup \{2, 4\} \cup \{4, \infty)$
- ▶ $(-\infty, 2.5) \cup (2.5, 4.5) \cup (4.5, \infty)$
- ▶ All of these are incorrect

Question No: 3 (Marks: 1) - Please choose one

If the $\lim_{x \rightarrow a} f(x) = L$ then the inequality $(L - \varepsilon) < f(x) < L + \varepsilon$ holds in any subset of the interval

- ▶ **$(a - \delta, a) \cup (a, a + \delta)$**

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- ▶ $(a-1, a) \cup (a, a+1)$
- ▶ $(a-\varepsilon, a) \cup (a, a+\varepsilon)$
- ▶ None of these

Question No: 4 (Marks: 1) - Please choose one

$L - \varepsilon < f(x) < L + \varepsilon$ Can be written as

- ▶ $|f(x) - L| < \varepsilon$
- ▶ $|f(x) - L| > \varepsilon$
- ▶ $|f(x) - L| < \varepsilon + 1$
- ▶ None of these

Question No: 5 (Marks: 1) - Please choose one

If a function satisfies the conditions

$f(c)$ is defined

$$\lim_{x \rightarrow c^+} f(x)$$

Exists

$$\lim_{x \rightarrow c^+} f(x) = f(c)$$

Then the function is said to be

- ▶ Continuous at c
- ▶ Continuous from left at c
- ▶ Continuous from right at c
- ▶ None of these

Question No: 6 (Marks: 1) - Please choose one

$$\frac{d}{dx}[sex] = \text{-----}$$

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☒ $\frac{\sin x}{1 - \sin^2 x}$

☐ $\frac{-\sin x}{1 - \sin^2 x}$

☐ $\frac{1}{1 - \sin^2 x}$

☐ None of these

Question No: 7 (Marks: 1) - Please choose one

$\log_b ac = \text{-----}$

☒ $\log_b a + \log_b c$

☐ $\log_a b + \log_c b$

☐ $\log_{a+c} b$

☐ None of these

Question No: 8 (Marks: 1) - Please choose one

$\log_b a^r = \text{-----}$

☐ $a \log_b r$

☒ $r \log_b a$

☐ $b \log_a r$

☐ None of these

Question No: 9 (Marks: 1) - Please choose one

If $f''(x) < 0$ on an open interval (a,b) then f is ----- on (a,b)

☐ None of these

☐ Concave up

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- ▶ Concave down
- ▶ Closed

Question No: 10 (Marks: 1) - Please choose one

If f is a twice differentiable function at a stationary point x_0 and $f''(x_0) > 0$
then f has relative At x_0

- ▶ Minima
- ▶ Maxima
- ▶ None of these

Question No: 11 (Marks: 1) - Please choose one

A line is called a tangent line to the circle if it meets the circle at precisely
.....

- ▶ One point
- ▶ Two points
- ▶ Infinite points
- ▶ None of these

Question No: 12 (Marks: 1) - Please choose one

The equation $(x+4)^2 + (y-1)^2 = 6$ represents a circle having center at
and radius

- ▶ $(-4,1),\sqrt{6}$
- ▶ $(-4,1),6$
- ▶ $(-4,-1),\sqrt{6}$
- ▶ None of these

Question No: 13 (Marks: 1) - Please choose one

$\lim_{x \rightarrow a} f(x)$ where $f(x) = k$
The (k is a constant) is equal to

- ▶ $k+2$

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- ▶ $k+1$
- ▶ k
- ▶ kf

Question No: 14 (Marks: 1) - Please choose one

For any polynomial $P(x) = c_0 + c_1x + \dots + c_nx^n$ and any real number a
 $\lim_{x \rightarrow a} P(x) = c_0 + c_1a + \dots + c_na^n =$

- ▶ $P(a)$
- ▶ $P(a+1)$
- ▶ $P(a-1)$
- ▶ $\frac{1}{P(a)}$
- ▶

Question No: 15 (Marks: 1) - Please choose one

Polynomials are always Function

- ▶ Continuous
- ▶ Discontinuous

Question No: 16 (Marks: 1) - Please choose one

$$\frac{D}{Dx}[dh(x)] = \text{-----}$$

where d is a constant

- ▶ $dh(x)$
- ▶ $dh'(x)$
- ▶ 0
- ▶ None of these

Question No: 17 (Marks: 1) - Please choose one

The graph $x = y^2$ is symmetric about

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- ▶ X-axis
- ▶ Y-axis
- ▶ Origin
- ▶ None of these

Question No: 18 (Marks: 1) - Please choose one

Consider two function $f(x) = 3\sqrt{x}$ and $g(x) = \sqrt{x}$ what is true about these functions

- ▶ $f(x).g(x) = 3x$
- ▶ $\frac{f(x)}{g(x)} = 3x$
- ▶ $f(g(x)) = 3x$
- ▶ None of these

Question No: 19 (Marks: 1) - Please choose one

$$\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

The formula is called with respect to x of the function f

- ▶ Derivative
- ▶ Slope
- ▶ Tangent
- ▶ None of these

Question No: 20 (Marks: 1) - Please choose one

$$\frac{d}{dx} \left(\frac{f}{g} \right)$$

Suppose that f and g are differentiable function of x then

$$\frac{g \cdot f' - f \cdot g'}{g^2}$$

$$\frac{g \cdot f' + f \cdot g'}{g^2}$$



$$\frac{g \cdot f' - f \cdot g'}{g}$$



► None of these

Question No: 21 (Marks: 2)

$$\frac{dy}{dx} = -\frac{3yx^2 + 1}{28y^3 + x^3}$$

If _____ then find the slope of the tangent line at the point (2, 0).

Question No: 22 (Marks: 3)

$$\text{Let } f(x) = \begin{cases} \frac{x^2 - x - 2}{x + 1} & \text{if } x \neq -1 \\ -3 & \text{if } x = -1 \end{cases}$$

At what points the function f is continuous and discontinuous? At point of discontinuity if any explain why it is discontinuous?

Question No: 23 (Marks: 5)

Differentiate w.r.t. x by chain rule $y = \sqrt{x^2 + 1}$

Question No: 24 (Marks: 10)

Evaluate the following limit

$$\lim_{y \rightarrow -2} g(y) \text{ where, } g(y) = \begin{cases} y^2 + 5 & \text{if } y < -2 \\ 3 - 3y & \text{if } y \geq -2 \end{cases}$$